Specifications for a
Communications Interoperability Device
10-X-2214624

1.0 Overview

The intent of these specifications is to provide a complete and operational interoperable communication system.

The communications interoperability device shall interface with any combination of radios (VHF low band, VHF high band, UHF, and 700/800 MHz), conventional telephones, cellular telephones, satellite telephones, PCS phone or ESMR while allowing multiple simultaneous two-way conversations or conference calls. The device will include built-in voice prompts to guide users in the operation of the completely modular interconnect system.

This unit shall be bid in three separate configurations:

- Equipment installed in a fixed configuration;
- Equipment installed in a mobile configuration;
- Equipment configured as a transportable configuration.

The mobile and transportable configurations may have reduced capabilities. A listing of the number of possible inputs, any deleted functions and other information must be provided for each configuration.

The basic unit will consist of the chassis, backplane board, power supply, hand-set module and control processor module.

The successful bidder will also make available classroom hands-on training for users and technicians for this specific equipment.

2.0 Specifications

2.1 Interoperability Capabilities

This device shall interface narrow band radios to wide band radios, analog channels to digital channels, low band VHF radios to high band 800 MHz radios, and conventional channels to trunking talk group radios. In addition, it will interface VHF (wide or narrowband), UHF (wide or narrowband) 700 MHz or 800 MHz in any combination. It shall be capable of interfacing various trunking talk group radios including smart net radios, and MPT-1327 radios. The

interoperability solution will also be capable of interfacing any type of radio to any public telephone network, to private access branch exchanges, to SATCOM terminals, to cellular systems and to Nextel/Southern Linc systems. It shall also cross-connect multiple diverse encrypted radio networks together seamlessly.

The device shall be fully compatible with existing ACU-1000 gateways currently installed and in use across the State of Alabama.

2.2 Capacity

The interoperability device shall be capable of interconnecting from two (2) communication devices to twelve (12) communication devices, at a minimum in each chassis, for up to six talk groups. Chassis must have the ability to be combined to increase the total capacity of the device.

In the mobile configuration, the interoperability device shall be capable of interconnecting up to four audio ports, two VoIP channels and the gateway operator's handset. The mobile interoperability device shall have a local control-pad, headset or handset with speaker and microphone.

2.3 Unit Control

The interoperability device will have local keypad control, microphone input and headphone/speaker output via the front panel. It shall allow remote DTMF control of cross-connects over RF links, over phone circuits, over PBX circuits, over SATCOM paths, over cellular channels or from a PC.

The device will also use a Windows-based software control package compatible with Windows 98, 2000, NT and XP to provide a user-friendly GUI (graphic user interface) depicting system operation and allowing programming of features. It shall also include RS-232 serial remote control.

This Windows-based software control package shall allow connecting and disconnecting of any interoperability channel with any other interoperability channel. It shall permit programming of all DSP radio interface features, as well as phone interface features, or SATCOM interface features. This software will keep an historic log of all interoperability transactions referenced to time of day, shall permit password protection of all critical features, and shall allow priority access and rejection relative to individual passwords. It shall provide the ability to program and store specific interoperability scenario combinations based on individual contingencies and related interoperability response plans. It shall allow quick and easy all-call broadcast of emergency messages over all channels

simultaneously. It shall provide for monitoring of any combination of interoperability channels by any other channel.

Each interoperability device shall allow from two (2) to six (6) cross-connect nets at one time. The software shall allow multiple interoperability gateways to be networked together over a large area to produce wide area interoperability systems.

The device must be capable of connecting to and being operated by Raytheon's wide area interoperability software (wais). The device must be fully capable of transmitting and receiving patched radio traffic while connected to an ACU-1000 gateway connected via the wais.

3.0 Unit Capabilities

3.1 Digital Signal Processing (DSP) Capabilities

This particular device shall employ a digital signal processing (DSP) algorithm on each radio interface that will detect speech spectrum in heavy receiver noise to key cross-connected radios or other communication devices reliably with carrier operated relay (COR) signals. This speech spectrum detector shall be capable of ignoring sirens, whistles, horns, etc., without falsely keying cross-connected radios. In addition, it shall provide a DSP noise reduction algorithm capable of cleaning up noisy receiver signals before transmitting them over clean channels.

3.2 Telephone Interface Capabilities

The interoperability device shall also employ a DSP-based adaptive hybrid to produce dynamically adjusted nulls at a minimum of 45db at every audio frequency on telephone interfaces. The adaptive broadband hybrid nulls will allow reliable interfacing of any radio to low quality phone lines. The device shall also provide a reliable DSP VOX (Voice Operated Transmit) algorithm to key radios from voice signals received remotely over phone, SATCOM and cellular circuits.

It shall also be designed to include a local telephone interface capability to act as an extension phone for the interconnect system. The local phone circuit shall produce ring voltage, loop current, busy signal, and dial tone so an interfaced conversional phone acts as though it is hooked to the central office even though it is connected to the interoperability device over nothing but a 2-wire direct circuit. This device will also allow interfacing with remote radios over dial-up lines, leased lines, microwave circuits, LANs, WANs or the internet.

It shall offer VOIP capability optimized for radio performance, and be capable of operating transparently over a network. It shall allow network interfacing over T1, E1, frame relay, DSL and cable modem. The VOIP performance of the unit shall allow use of a wide area data network more efficiently by including radio voice communications comprised of transmit audio, keyline, receive audio and COR.

3.3 Power Source/Supply

The unit must be capable of operation from 12VDC and 115VAC power sources. All AC and DC power cable shall be provided with the units.

3.4 Devices That Can Be Cross-Connected

The interoperability solution shall be capable of interconnecting with VHF low band, VHF high band, UHF, and 700/800 MHz through a multitude of specially designed radio interface cables. It must allow users to interconnect a wide array of radios of all types by selecting appropriate cables from an interface cable cache defined during the contingency planning portion of a site survey. The unit must be designed to allow interconnection and operation of a newly arrived radio in less than five (5) minutes when the interface cable is available.

3.5 Lost Phrases or Syllables

This device will use digital delay to guarantee no lost syllables resulting from channel acquisition times when cross-connecting trunking radios. The required sophisticated digital delay capability shall be DSP-based and shall delay speech going into the transmit side of a trunking radio until channel acquisition occurs.

3.6 Radio System Interface Capabilities

The interoperability solution shall be capable of interfacing local government trunked or conventional wireless radio networks with state conventional and trunked land mobile radio systems as well as digital to analog radio system. It will also be able to interface state radio systems with federal agency radios during and after a terrorist incident or weather-related disaster.

3.7 Configuration of Units

The interoperable equipment shall be bid in three configurations as specified in the Section 1.0 Overview. A complete listing of capabilities must be included in bid for each configuration.

Fixed Configuration:

The fixed configuration shall be the device contained in an open or closed equipment type rack unable to be moved or transported to a different location while in operation.

Mobile Configuration:

The mobile configuration shall be capable of deployment as a tactical package for on-scene interoperability by one person.

- The following mobile configuration option shall be priced in the Vendor's price catalog:

  This option shall allow for the mobile device to be stored in a hard plastic case (Pelican model or equivalent) with customized foam inserts to protect device, cables, and portable radios. The case must support carrying the device, up to 4 portable radios, all cables needed to operate the device, and any other items needed in order to properly deploy and utilize the device. To be included in this catalog pricing option is four patch cables, the type to be determined at the time of order by the purchaser. The case should be pre-configured to allow the appropriate storing of the device, cables, and portable radios. The case should be of such size and weight to be handled easily and safely by a First Responder and fit into a trunk of a Ford Crown Victoria or Sports Utility Vehicle.

Transportable Configuration:

The transportable configuration shall have the same capabilities as the fixed configuration and be capable of movement from one site to another. This configuration must be self contained and capable of being transported by two or more people.

3.8 Remote Operation

The device shall perform either as an unmanned gateway or as a manned gateway while providing interoperability over multiple radios. The public telephone interface feature shall be designed to permit incident commanders to participate in problem management of an interoperability solution when not on scene. The device must be fully capable of being operated by the Wide Area Interoperable

Software that is currently used in Alabama to remote operate existing radio gateways.

3.9 Network Software

The device shall allow the interconnection of multiple devices with multiple radios at other sites by networking together two or more devices simultaneously. This would allow for regional and state wide interoperable connections. In order to produce this connectivity, the device shall operate utilizing computer software showing multiple gateway's status, talk groups, and busy channels. The device must be fully functional with this software. The Software must produce talk groups and patches across the entire established network. This software must be fully compatible with the existing Wide Area Interoperable Software (WAIS) already in use throughout Alabama.

This software shall be a onetime purchase, per license and shall not have a reoccurring cost. New versions of the software and/or upgrades of any kind shall be supplied to the end user during the term of the contract at no cost.

3.10 Computer Interface Capabilities

The interoperability device shall also include an ethernet-to-serial remote control interface allowing the required computer control software to operate from multiple dispatch locations simultaneously. It shall also be equipped with networking capability to allow control of multiple interconnects gateways from multiple computers simultaneously in a wide area of interoperability format.

4.0 Radio and Communications Interface Cables

Radio and communications interface cables will be included in the purchase for the initial installation of 12 inputs/outputs. Cabling for additional radio units will be specified at the time of purchase and must be available (pre-made) through the successful bidder.

5.0 Assembly and Staging

The device(s) must be shipped, tested and ready for usage at no additional cost, if required by the purchaser.

Radios used with the radio gateway devices will be supplied by the purchaser.

6.0 Installation

Devices requiring installation must be installed by a local, trained, authorized dealer and/or representative. **Vendor must submit a listing of all their authorized dealers in the State of Alabama with this bid.**

7.0 Training

User training will be conducted on-site or at a location suitable to and provided by the purchaser. It is estimated that each training class would have approximately 8-15 students. The bid price shall include all student materials. The bid price shall include all expenses for the instructor for one class.

Factory training for the technicians will also be available to cover set-up, optimization, deployment and basic maintenance of the unit. Each class shall consist of two days of training at the factory training location. The bid price shall be per individual.

8.0 Warranty

Warranty period for the interoperability device, signal processing modules and cables will be for twelve months, after installation, to cover parts and labor.

The bid price shall include one year (warranty period) of software updates.

Installation time frame will not exceed six months from date of purchase.

The warranty period shall start after final acceptance of the system.

9.0 Maintenance and Service

Maintenance and Service shall be available from local, trained, authorized representatives.

10.0 Replacement Parts Inventory

An inventory of immediately available spare replacement parts shall be maintained by the successful bidder. The minimum inventory will include the following items:

Power Supply

Handset Module
Control Processing Module
Backplane Board
Speaker
Handset
VoIP Interface Module
Telephone Interface Module
Radio Interface Module

A catalog for all replacement parts and accessories must be submitted with pricing at the time of bid.

If any equipment is discontinued during the contract period, replacement equipment must be equal to or greater in performance, features and function, and at the same price, terms and conditions as stated in the bid.

11.0 Price Catalog

Vendor must submit with bid the price catalog/list that will be in effect during the proposed contract period; otherwise the bid will be rejected.

At a minimum, the following must be included in the Vendor's Catalog Pricing each item listed in the catalog at a fixed price:

- Case and Cables (as specified above in Section 3.7 Mobile Configuration)
- Interface cabling
- All replacement parts and accessories (at a minimum those items listed in Section 10.0)
- Installation (hourly rate) and (mileage rate)
    - Installation is the cost(s) incurred or associated with the setup of the purchased equipment.
- Pre-Installation Survey (hourly rate) and (mileage rate)
    - Pre-Installation Survey is defined as an authorized technician coming to a site where this device is already installed and conducting a visual inspection of the current configuration of the system. This will also included the technician's completion of a handwritten or electronic survey document.
- Maintenance (hourly rate) and (mileage rate)
    - Maintenance is defined as an authorized technician performing on-site work where device is installed or via internet/VPN connection to resolve or fix a problem hindering the device and/or network from working properly.